TACOM

Lethality, Survivability, Mobility and Sustainment for America's Army

Truck Transformation Enabling Army Transformation

2002 Tactical Wheeled Vehicles Conference

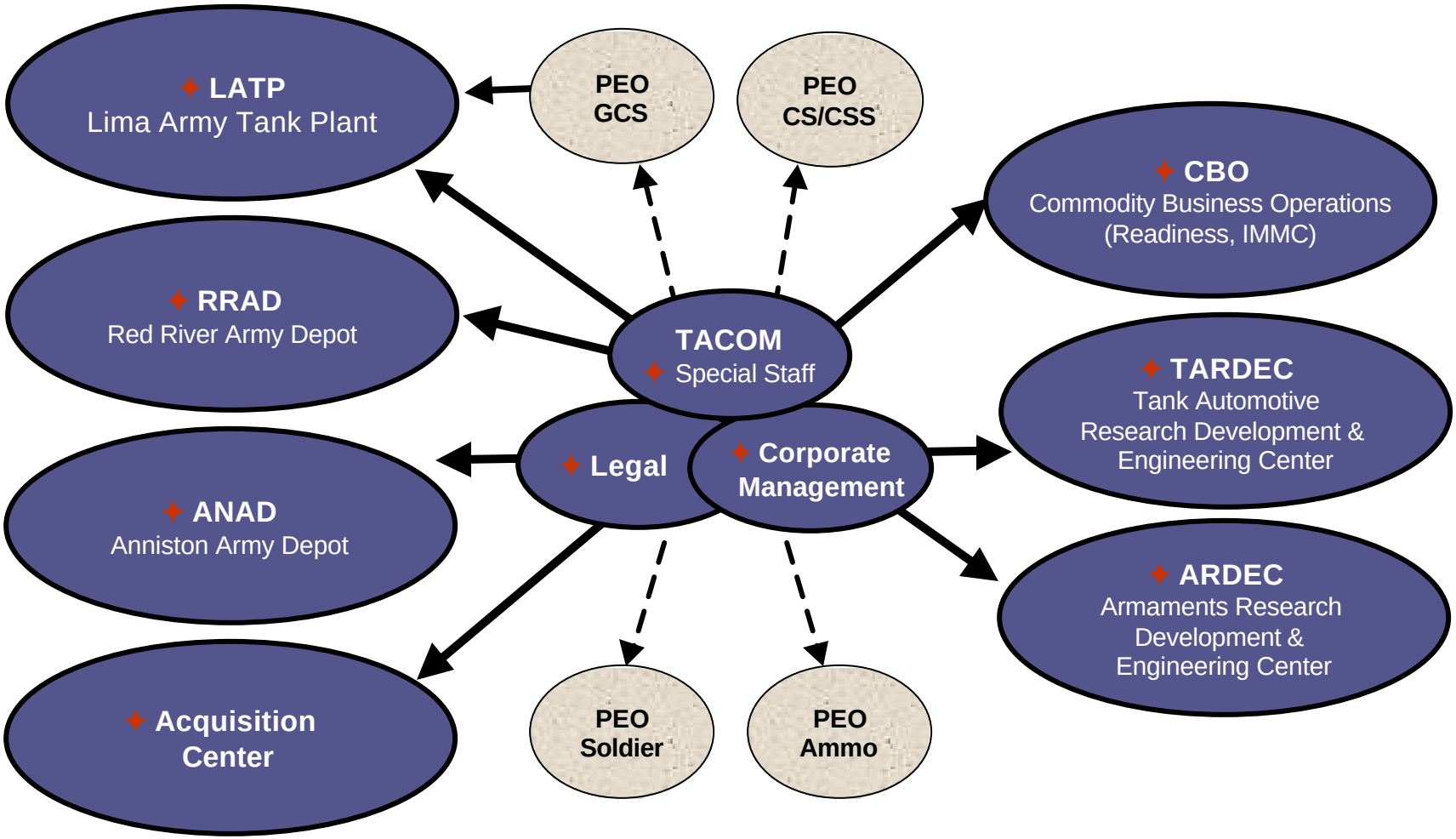
January 29, 2002

MG N. Ross Thompson III
Commanding General

Outline

- TACOM
- Advanced Collaborative Environment
- Requirements
- Fuel Efficiency
- National Automotive Center
- Hybrid Electric Vehicles
- Fuel Cells
- Battlefield Fuel Users
- HE Assessment (BCT Example)
- Conclusion

Tank-automotive and Armaments Command
Organizational Structure



A Team of Valued and Empowered Professionals

Supporting Army Readiness




SUPPORT

- Capital Value of TACOM Equipment $81.7B
- 2993 Fielded End Item NSNs Supported
- > 27,000 Component NSNs

PRODUCT LINES

- Combat Vehicles
- Trailers
- Materiel Handling Equipment
- Fuel & Water Dist Equipment
- Chemical Defense Equipment
- Howitzers
- Mortars
- Machine Guns
- Aircraft Armaments
- Rail
- Petroleum & Lube Equipment
- Tactical Vehicles
- Construction Equipment
- Tactical Bridges
- Sets, Kits & Outfits
- Shop Equipment
- Large Caliber Guns
- Rifles
- Ammunition
- Demolitions & Explosives
- Watercraft
- Non-Tactical Vehicles

MAGNITUDE

- 72% of Army's Reportable Density is TACOM Supported
- 81 Allied Countries own TACOM Equipment
- 97% of All Army Parent UICs Contain TACOM Supported Equip

Plus Technology Development for the Objective Force



The Army's Lead Systems Integrator

The Synergy of the TACOM / (PEO)^4 Community

Skills, Interactions & Resources - Leading Us Forward

Technology: Leading-edge research and development

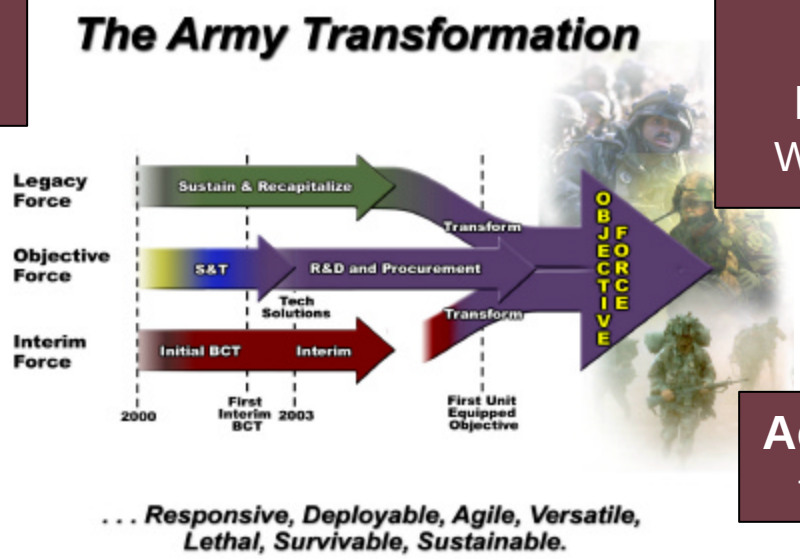
Public-Private Partnering: Sharing World-class Technology

Acquisition: Streamlining the Contracting Process

Program Management: Putting warfighting capability into the hands of the warfighter

Logistics: Maximizing weapon system capability with responsive support concepts

Integrated Industrial Center: Projecting & Sustaining Combat Power



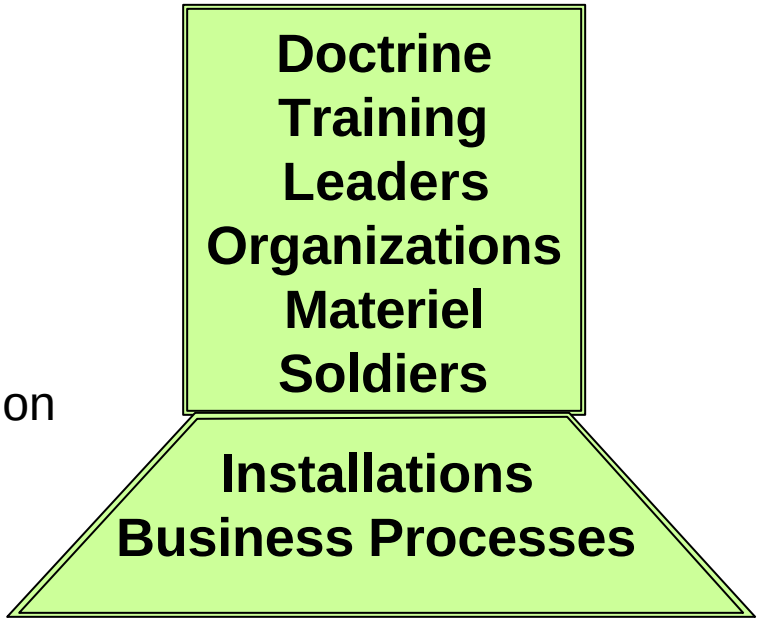
Managing Across the Life Cycle with Our Industry Partners

Strategic Objectives

- Make customer support and satisfaction our top priority.
- Revitalize the workforce to meet 21st century challenges.
- Deliver world class technology on time to support FCS Block 1.
- Ensure seamless integration/synchronization between TACOM and its PEO partners.
- Create an Integrated Industrial Center and become the provider of choice.
- Reengineer the spare parts system.
- Make the financial system support the business, not the other way around.
- Create the model Integrated Business Environment / Integrated Data Environment.
- Partner to provide best value and capability.
- **Continue** to be the Army's lead system integrator for ground systems.

Army Transformation
It's About Changing the Way We Fight

- Financial Reforms are key to future success!
- Centralization and Restructuring Initiatives
- Integrated Industrial Center
- Cost Management/Activity Based Costing
- Army Working Capital Fund (AWCF)
- Acquisition Excellence
- ARDEC/TARDEC Reengineering and Collaboration
- TACOM Quality Federation
- TACOM Personnel Demo
- Advanced Collaborative Environment (ACE)



Synaptic Environment

Schools & Commands

Deployed Forces

Smart Systems

Detect Change

Make Assessment

Decide

Act

Evaluate

Basic Operations

Business reflexes

Digital Nervous System

Strategic thinking

Customer interactions

AMC

Army Staff

Dept of Defense

S & T Community

Program Managers

Training

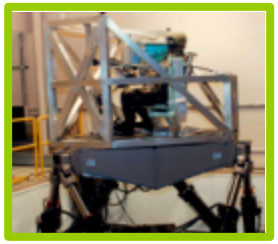
Industry & Associations

The Digital Nervous System Connects Players

Systems Integration

High Tech Collaboration Tools

In the Office



In the Lab

In the Field

Quickly Finding, Viewing, Understanding, and Using Information

World Wide Web

IDE

Managed by PTC WINDCHILL

On the Road

On the Shelf

In the Virtual World

Virtual IAV System Prototypes & Collaborative Evaluations

From the Desktop...

IDE

- 500+ Informed Stakeholders

PMO BCT, TRADOC, STRICOM, ARL, ATEC, Prime & Sub-contractors,Safety, etc.

- 10 BCT Variants Available

ICV, MGS, ATGM, MC, CV, RV, FSV, ESV
(Prior to Hardware)

…to the Virtual World

Stakeholders Must Be Linked Virtually

Evaluation Process for FCS Concepts

Refine Requirements

Develop Evaluation Plan

Evaluations in CAVE

Conduct Supporting Analysis

Variant Design

Analyze Results

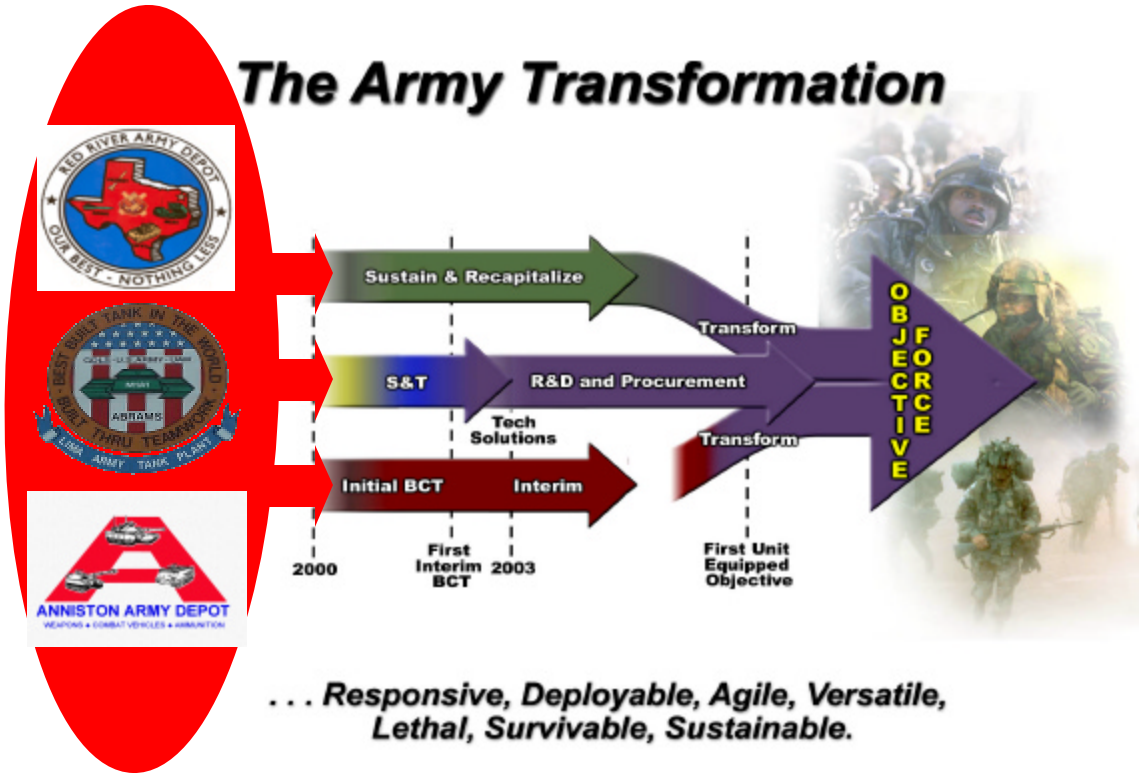
Evaluation Teams

Integrated Data Environment

Refine Base Design

Integrated Industrial Center

Vision: Create a 21st Century Industrial Center That Optimizes Ground System Readiness and Enables Transformation



Leverage all TACOM / $(PEO)^4$ Community Assets

(PEOs/RDECS/Acquisition/Corporate Mgmt/Commodity Business, Legal)

Goal is to Become the "Provider of Choice"

Requirements for Army's Future

- C130 Transportable
- Decrease logistics requirement by 33-50%
- Decrease fuel consumption by 50%
- Deployable in 96 hours
- Operate for 5 days without resupply
- Capable of – 100 kph top speed & 60 kph cross-country
- Survive 1st round engagements
- Affordable
- Use commonality
- Joint & combined interoperable
- Embedded training and human factors

Improving Fuel Efficiency is Key

Source: FCS Combined Analysis Plan, FCS Concept Objectives

Why Should the Military Target Fuel Efficiency?

• **Surprise:** Fuel efficiency increases platform stealth by diminishing the platform's heat signatures, exhaust, and/or wakes; and affords less chance of compromising movement by reducing the logistics tail and resupply communications.

• **Mass:** Fuel efficiency decreases the time required to assemble an overwhelming force.

• **Efficiency:** Fuel efficiency increases commander's flexibility in efficiently assembling an overwhelming force.

• **Maneuver:** Platforms will travel faster and farther with reduced weight and smaller logistics tails that improve platform agility, loiter and flexibility.

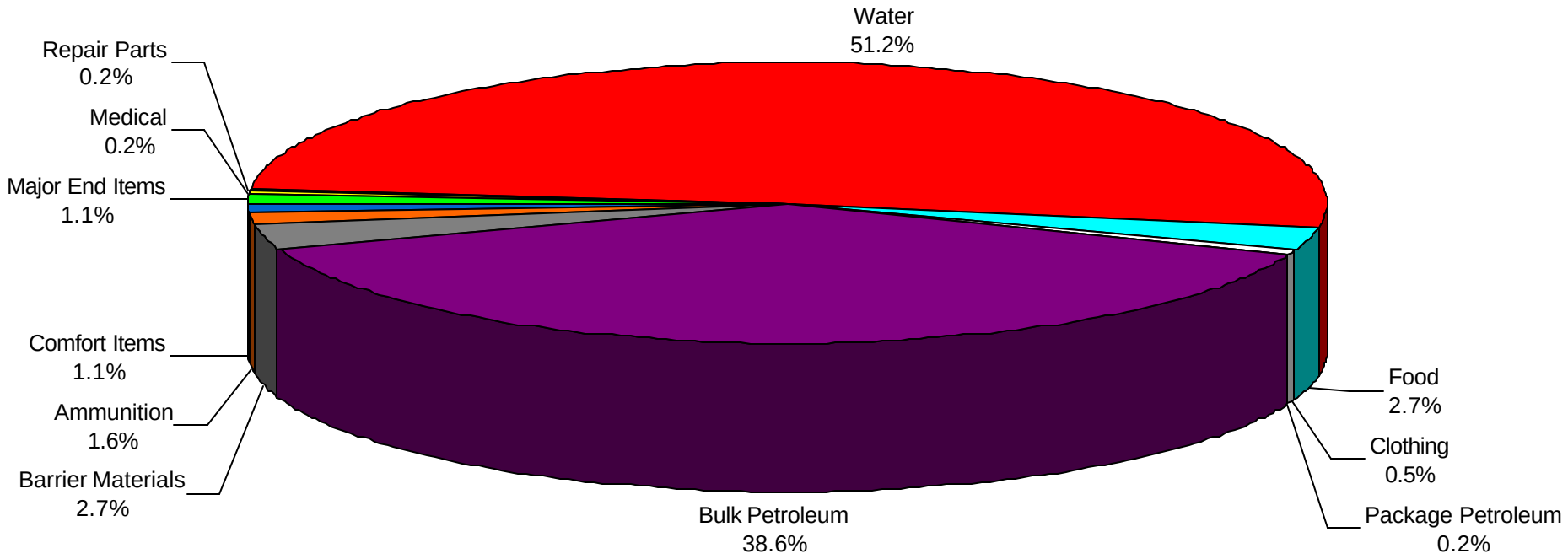
• **Security:** Fuel efficiency decreases platform vulnerability to attacks on supply lines, and reduces demand for strategic reserves.

• **Simplicity:** Fuel efficiency decreases the complexity and frequency of refueling operations and logistics planning, while reducing vulnerability to the "Fog of War".

Improved Warfighting Capability via Fuel Efficiency Increases

Source: Defense Science Board, January 2001

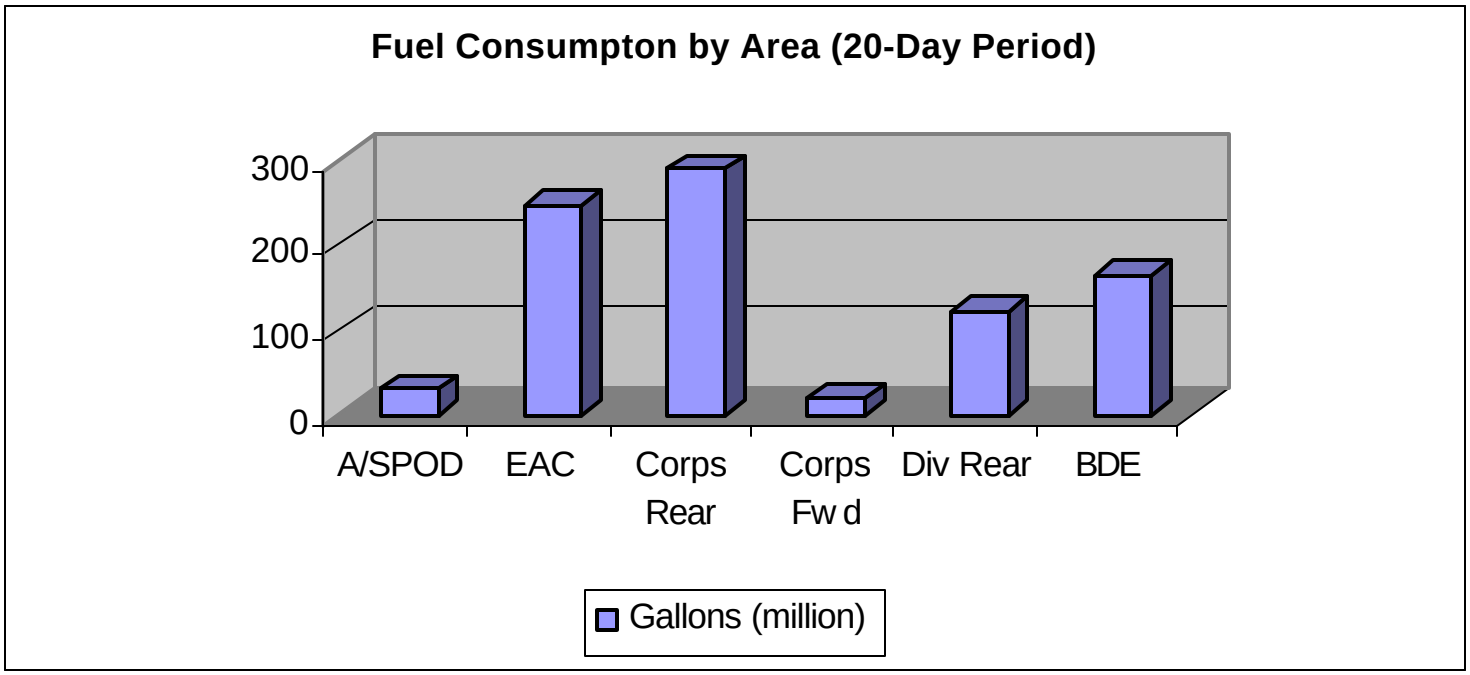
Fuel is the Second Largest Demand on the Battlefield



Next to Water, Fuel has the Most Tonnage on the Battlefield: 39% of the Demand

Source: Footprint Reduction 2 Study, CAA MTW – E1

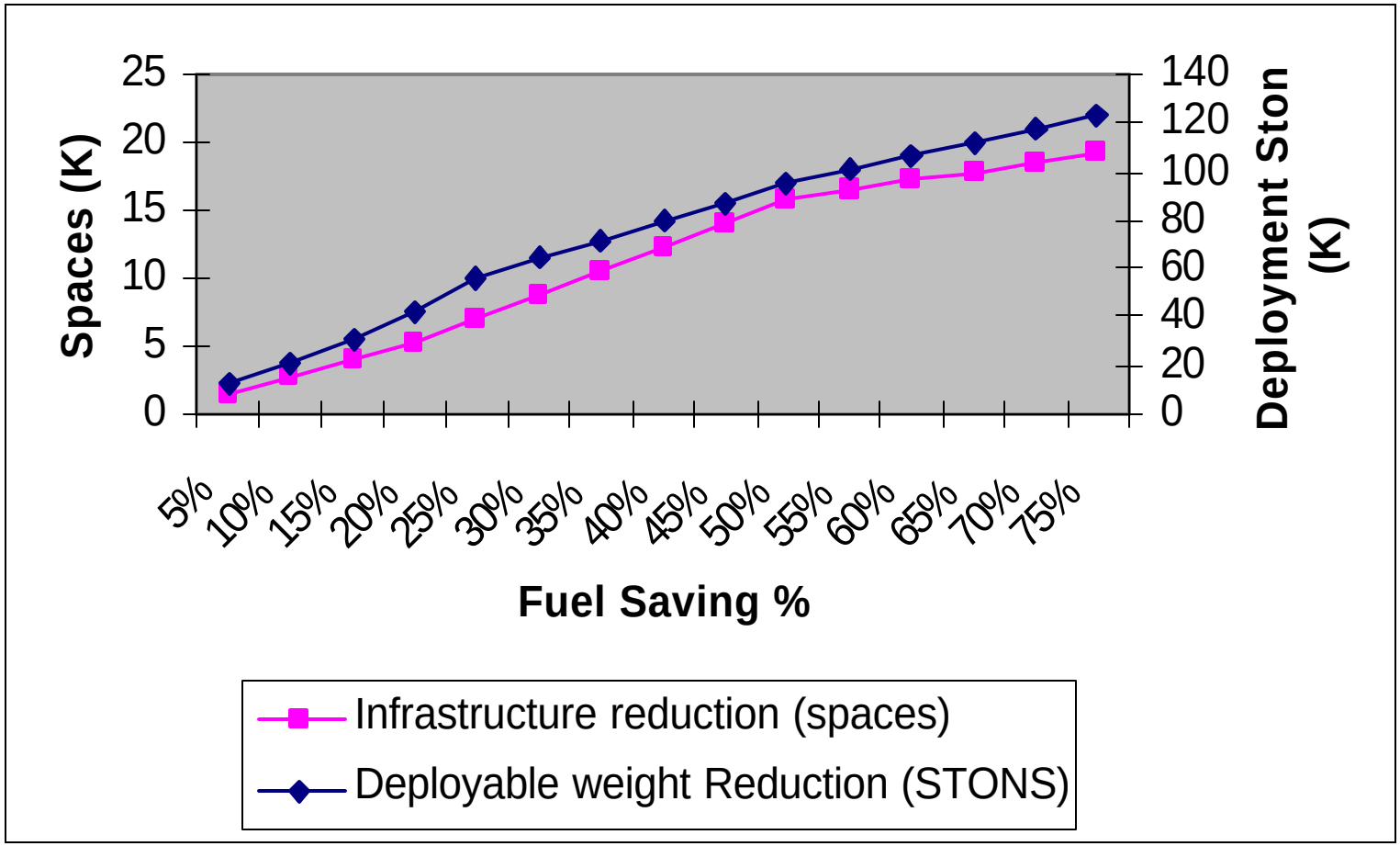
Largest Fuel Consumer is in Logistics Infrastructure Areas



65% of the Fuel Consumed in Theater is in the EAC and Corps Rear

Source: Footprint Reduction 2 Study, CAA MTW-FI

Fuel Savings Have Dynamic Impacts on Infrastructure and Deployment Weights



A 30% Fuel Savings in a Theater Battlefield Would Result in 5.85% Manpower Savings in the Logistics Infrastructure and 8.28% of Deployment Weight

Source: Footprint Reduction 2 Study, CAA MTW – E1

Improving Fuel Efficiency

Defense Science Board Findings, January 2001

- Although significant warfighting, logistics, and cost benefits occur when weapons systems are more fuel-efficient, these benefits are not valued or emphasized in the DOD requirements or acquisition processes.

- Basing fuel price on wholesale and excluding delivery costs prevents an end-to-end view of fuel utilization in decision-making, does not reflect true fuel costs, masks energy efficiency benefits, and distorts platform design choices.

- The DOD resource allocation and accounting processes (PPBS, DOD Comptroller) do not reward fuel efficiency or penalize inefficiency.

- Operational and logistics wargaming of fuel requirements is not cross-linked to the Service requirements development or acquisition program processes.

- High payoff, fuel-efficient technologies are available now to improve warfighting effectiveness in current weapon systems through retrofit and in new systems acquisition.

Reflect True Cost of Fuel to the Battlefield

Improving Fuel Efficiency

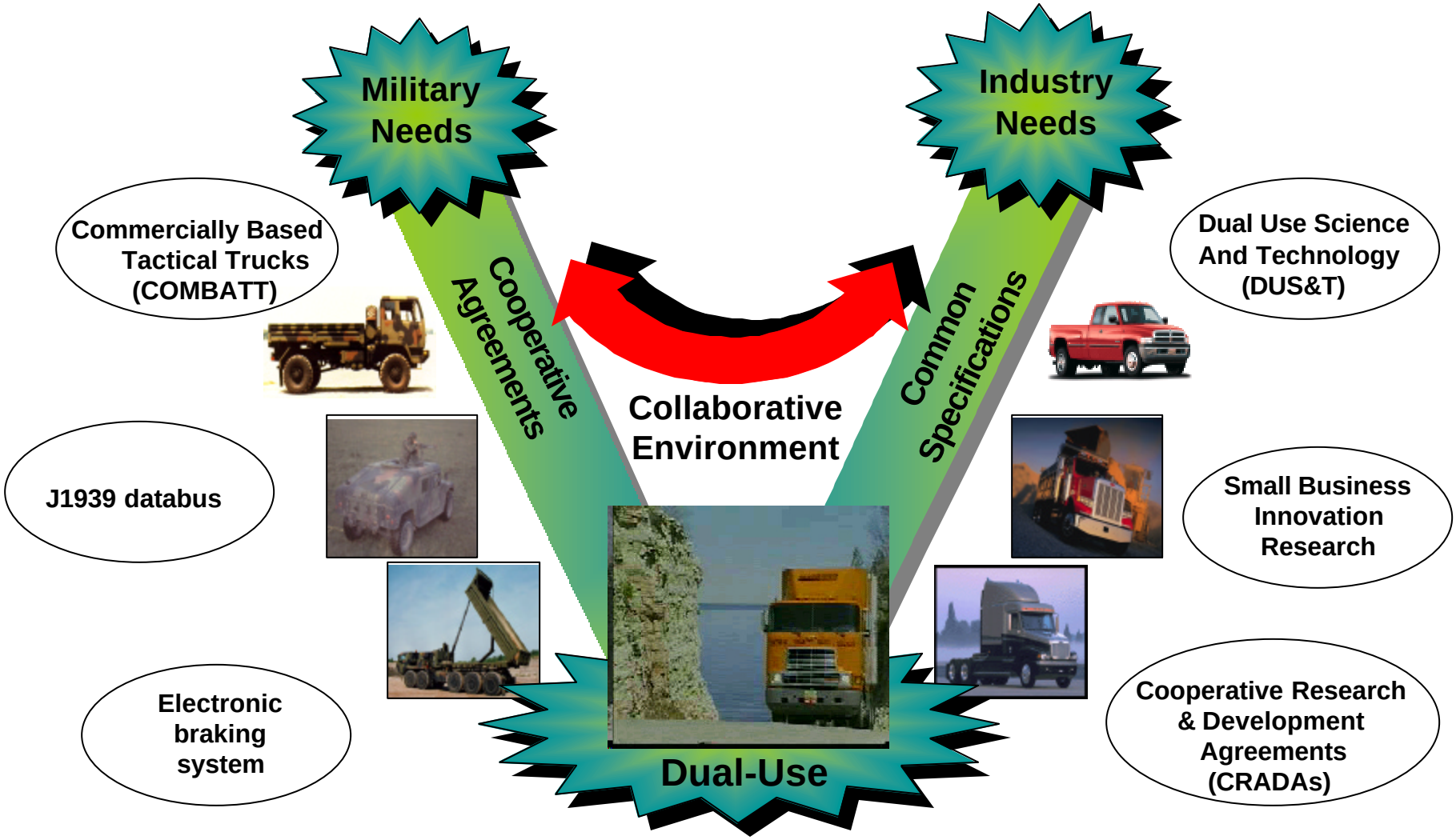
Defense Science Board Recommendations

- Base investment decisions on the true cost of delivered fuel and on warfighting and environmental benefits.
- Strengthen linkage between warfighting capability and fuel logistics requirements through wargaming and new analytical tools.
- Provide leadership that incentivizes fuel efficiency throughout the DOD.
- Specifically target fuel efficiency improvements through investments in Science and Technology and systems designs.
- Explicitly include fuel efficiency in requirements and acquisition processes.

We are Targeting Fuel Efficiency by Investing in Science and Technology

National Automotive Center

Dual-Needs Focus



Accelerating the Infusion of Commercial Technology

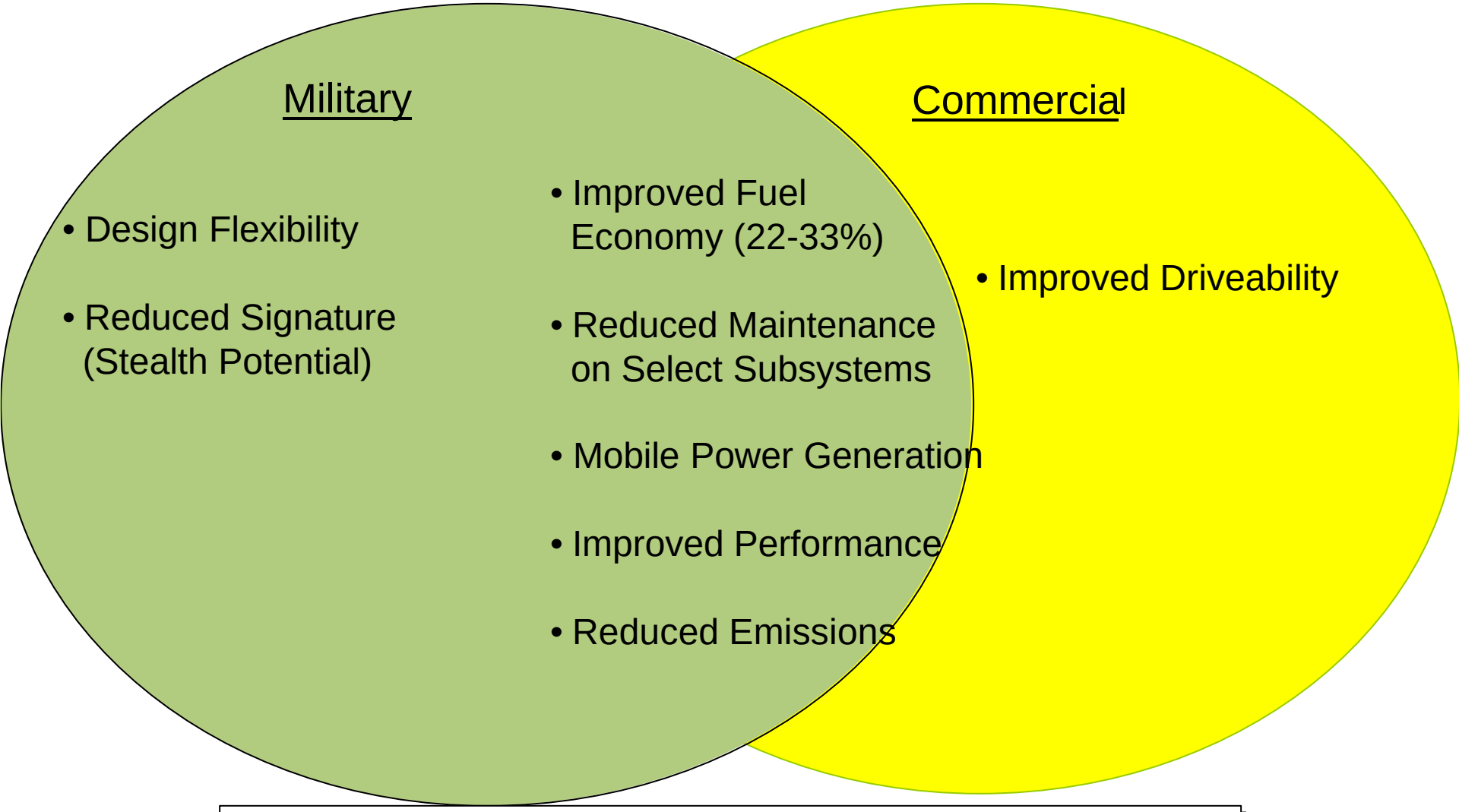
Army Hybrid Electric (HE) and Fuel Cell (FC) Implementation Roadmap

Premise: HE and Fuel Cells are enabling technologies for Army Transformation

- Totally Involve Warfighting, PM and Materiel Developer Communities
- Fully Understand Requirements (Capture Voice of Customer)
  - Military
  - Commercial Industry
  - Government (Regulations & Standards)
- Know Technology Capability (Investments Made by Government and Industry)
- Identify & Address the Issues (Known Deficiencies)
- Demonstrate HE and FC Technologies
- Mature HE and FC Technologies
  - Bridge the Gap Between Capabilities and Requirements
  - Test Vehicle Solutions and Feedback Data
- Initiate Acquisition Development Programs

HE Benefits

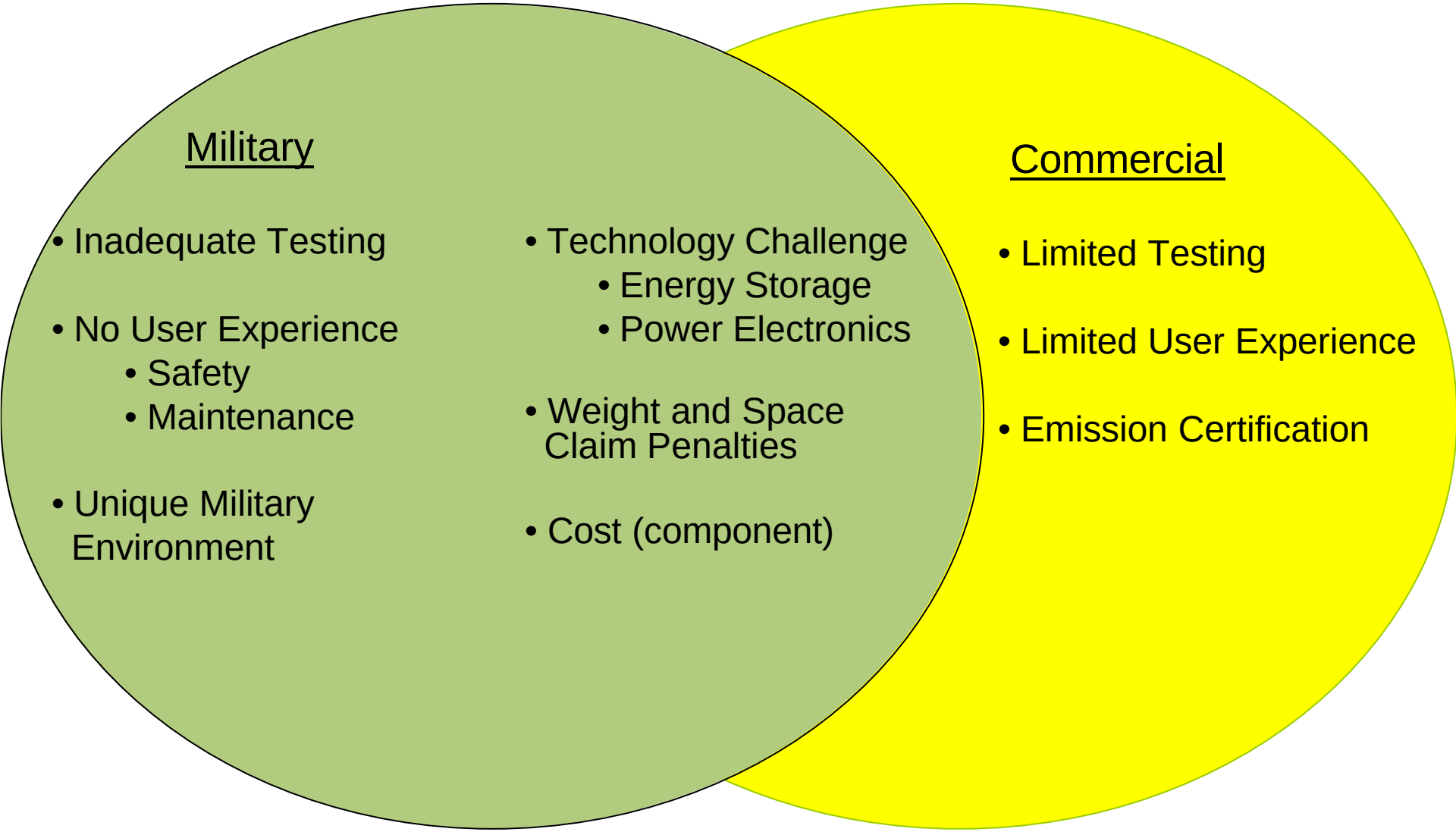
Comparing Military and Commercial Priorities



Military and Commercial HE Priorities are Similar

HE Issues

Comparing Military and Commercial Issues



HE Programs

FMTV

HMMWV

HEMTT

COMBATT

RST-V

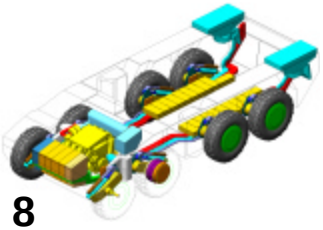
HIMARS

Bradley

CHPS

M113

FSCS



8 x 8

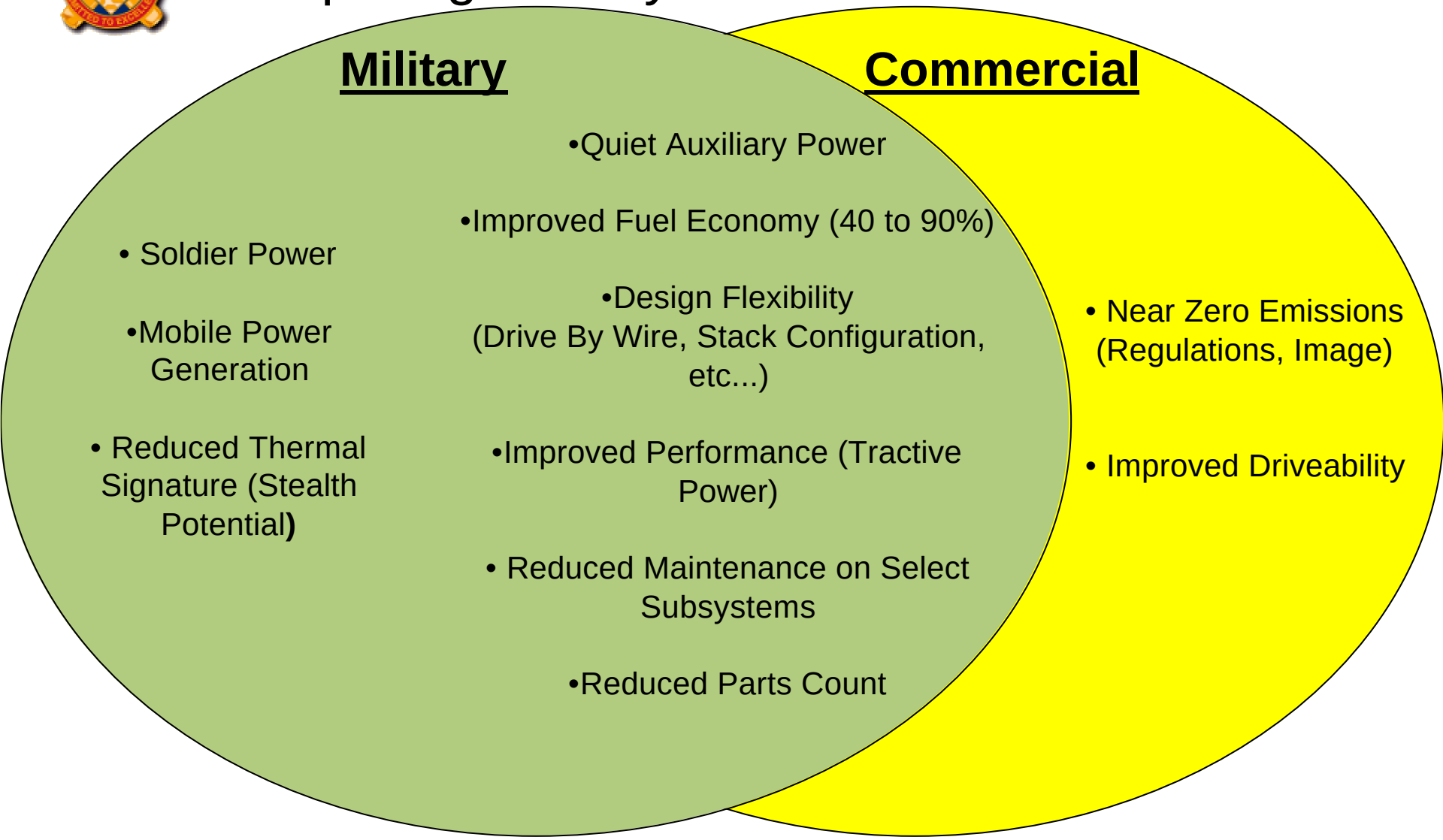
LAV 3

COMBATT Video

8X8 Video

FC Benefits

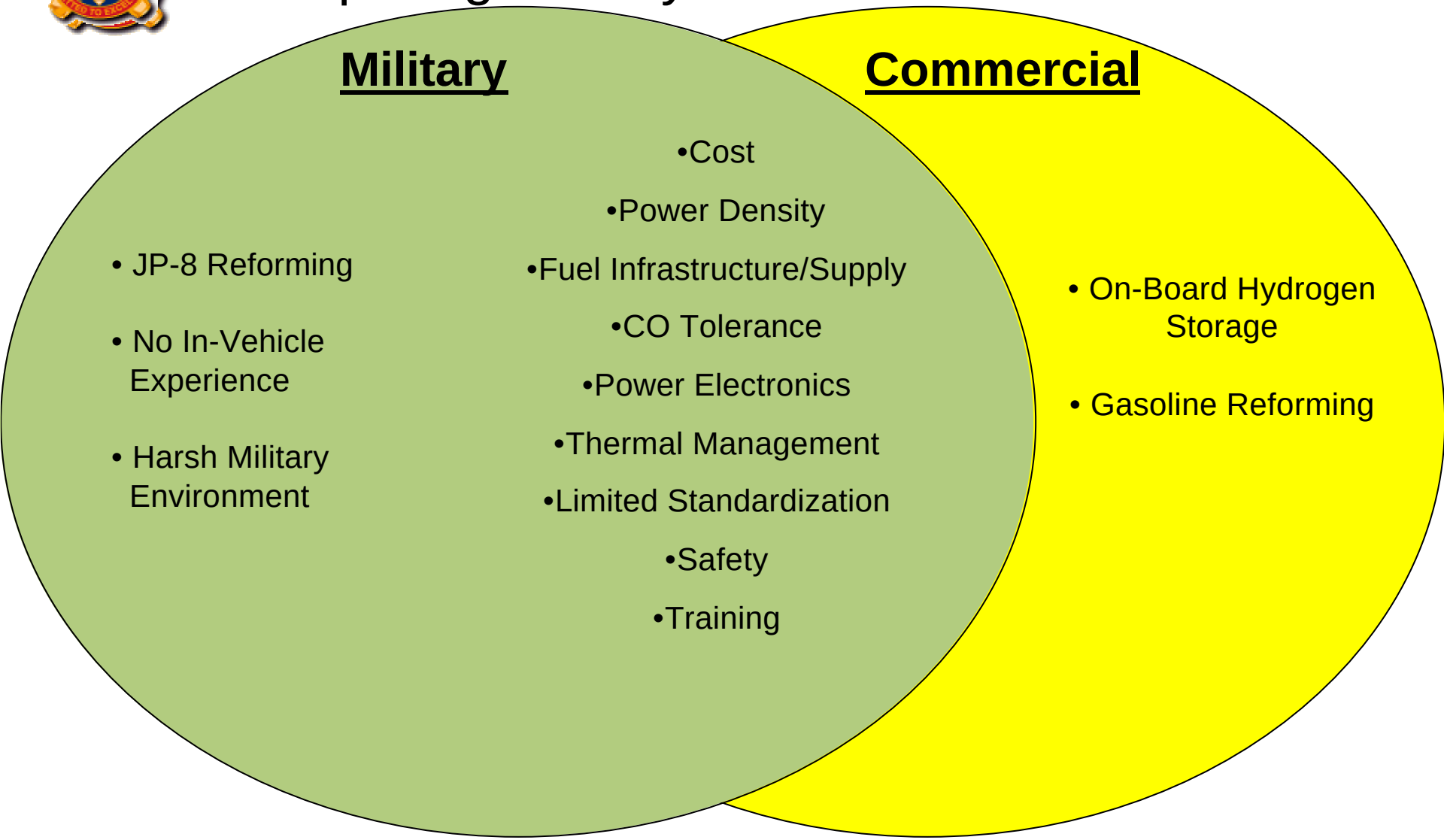
Comparing Military and Commercial Priorities



Military and Commercial FC Priorities are Similar

FC Issues

Comparing Military and Commercial Issues



FC Projects

Figure 11. Future concept for SOFC APU.

Solid Oxide Fuel Cell in a Heavy-Duty Vehicle

Phased Application of Fuel Cells in a Class 8 Trailer

Liquid Fueled Fuel Cell APU

Regenerable Fuel Cell

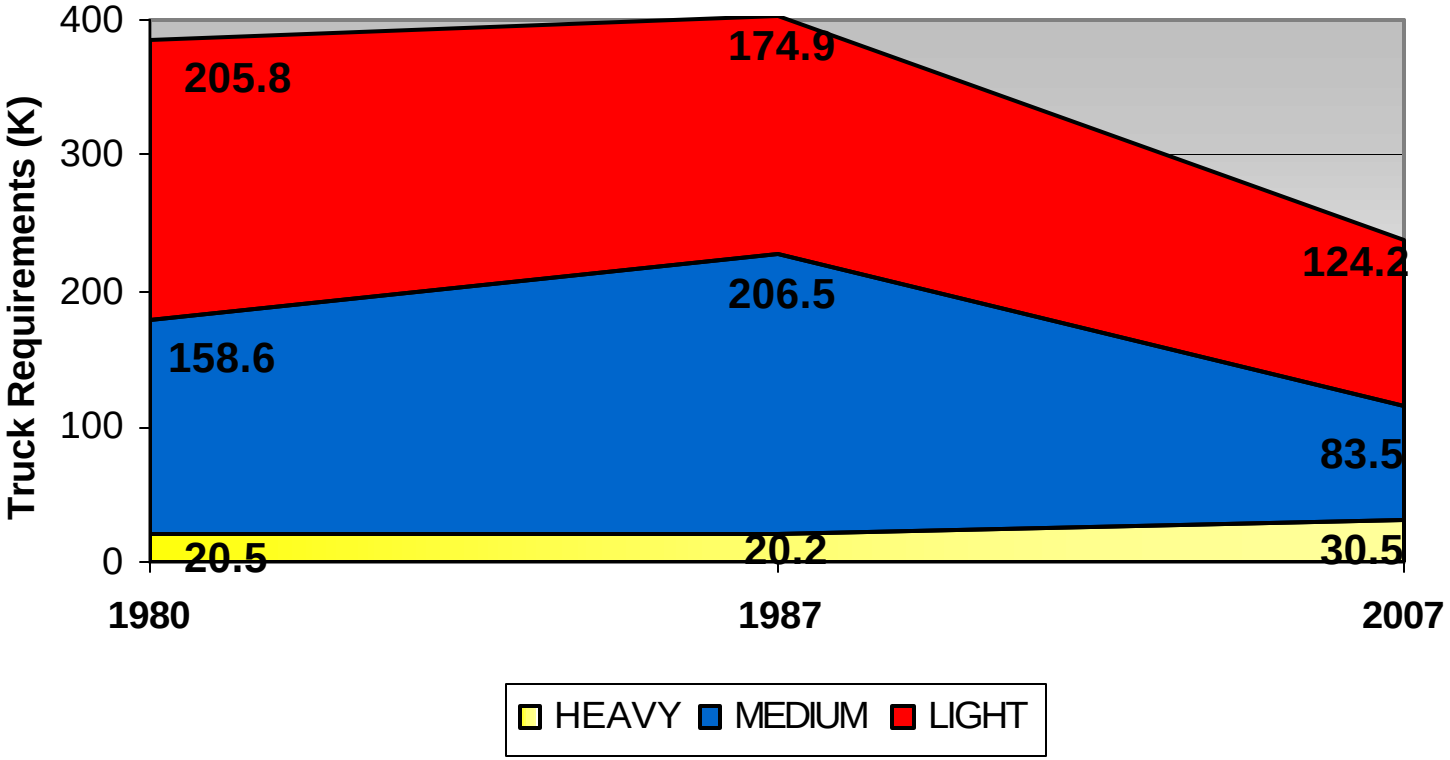
Top 10 Battlefield Fuel Users

- **Truck Tractor: Line Haul**
- UH60L
- **Truck Tractor: MTV**
- **Truck Tractor: HET**
- Tank M1A2
- CH47D
- Decontamination Apparatus
- **HMMWV**
- Water Heater
- AH64D

3 of the Top 4 Users are Trucks

Source: Total Army Analysis 07 (FY01), Southwest Asia Scenario

Truck Requirements



0.045% of Trucks Will Be Hybrid Electric in 2007

Goal: Maximize Number of HE Platforms

Source: Materiel ODCSPRO, January 2001

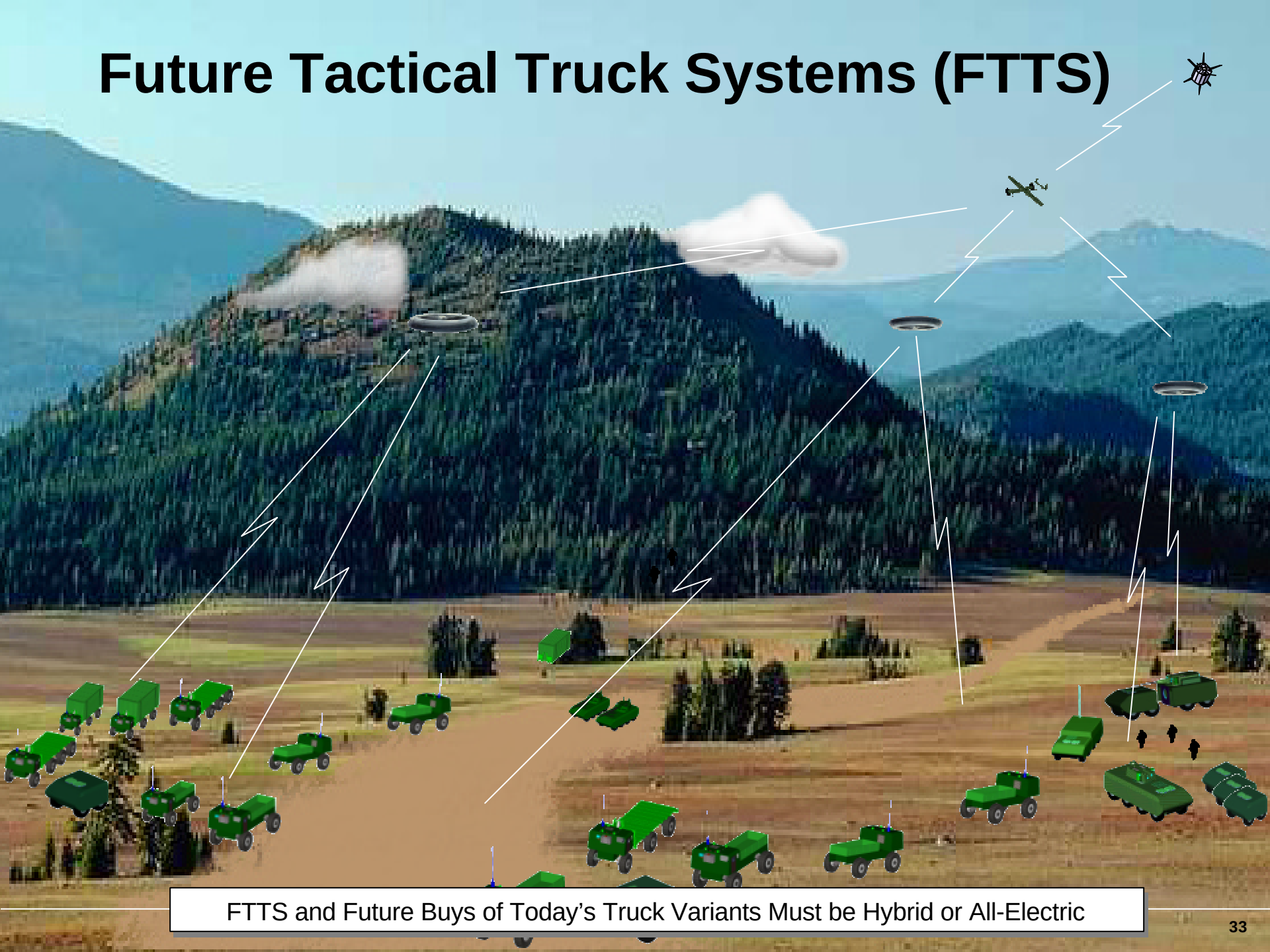
HE Effects on Brigade Combat Team (BCT)

In the BCT (assuming all vehicles are hybrids):

- Increase the range by 180 miles on a single tank of fuel
- Use 4,000 less gallons of fuel over 100 miles
- Increase an average of 37 miles per day over a 5 day deployment w/o resupply
- Increase the efficiency of the Support Battalion by 89,000 ton-miles per day
- Could replace some of the BCT's 123 generators that weigh 70 STONS and consume 19K cubic feet of space on deployment due to on-board electric power in the truck
- Expanding our analysis to demonstrate the real savings/cost avoidance in procurement offsets, spaces, and infrastructure

HE Effects are Dramatic in the BCT

Future Tactical Truck Systems (FTTS)

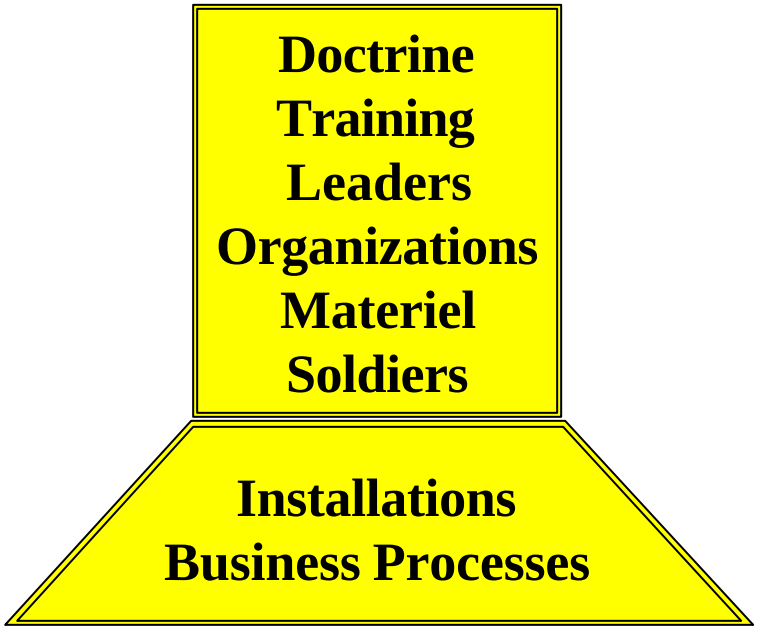


FTTS and Future Buys of Today's Truck Variants Must be Hybrid or All-Electric

Conclusion

Army Priorities

- Win the War
- Army Transformation
- Resources to Do Both



We Must Transform Together!